

DERWENT-ACC-NO: 2000-589534

DERWENT-WEEK: 200060

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TITLE: Polypropylene protective film for metal surfaces, has three-layer structure where each layer consists of composition comprising propylene homopolymer and ethylene-propylene copolymer

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PRIORITY-DATA: 1998JP-0344384 (December 3, 1998)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
PAGES MAIN-IPC		
JP 2000168006 A	June 20, 2000	N/A
012 B32B 027/32		

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO
APPL-DATE		
JP2000168006A	N/A	1998JP-0344384
December 3, 1998		

INT-CL (IPC): B32B027/32, C08L023/08 , C08L023/12

ABSTRACTED-PUB-NO: JP2000168006A

BASIC-ABSTRACT:

NOVELTY - The protective film is a multilayer film comprising a three-layer structure. Each layer consists of a polypropylene composition comprising a propylene homopolymer and an ethylene-propylene copolymer.

DETAILED DESCRIPTION - A polypropylene protective film is a multilayered film comprising a three-layer structure of (B)/(A)/(B). Each layer consists of a polypropylene composition comprising a propylene homopolymer and an ethylene-propylene copolymer.

The layer (A) consists of a polypropylene composition (a) consisting of crystalline polypropylene and amorphous copolymer. In (a) the following formulae (I)-(V) are satisfied:

$$(\eta)_{RC} = 1.7-2.8 \text{ dl/g (I).}$$

$$(\eta)_{RC}/(\eta)_{PP} = 0.7-1.2 \text{ (II).}$$

$$((\eta)_{RC}/(\eta)_{PP}) \times (WPP/WRC) = 1.0-3.0 \text{ (III).}$$

content of ethylene in amorphous ethylene-propylene copolymer = 25-55 percent by weight (IV).

$$(WRC-A) = 22-40 \text{ percent by weight (V).}$$

$(\eta)_{RC}$ = limiting viscosity of amorphous ethylene-propylene copolymer;

$(\eta)_{PP}$ = limiting viscosity of crystalline polypropylene;

WPP = weight of crystalline polypropylene;

WRC = weight of amorphous copolymer; and

(WRC-A) = percent by weight of amorphous copolymer to composition (a).

The layer (B) consists of a polypropylene composition (b) in which (WRC-B) is satisfied by formula (VI).

$$0.5 \text{ less than } (WRC-B)/(WRC-A) \text{ less than } 1.0 \text{ (VI)}$$

(WRC-B) = percent by weight of amorphous copolymer to composition (b).

USE - The film is used for protecting the surfaces of metals, particularly for protecting a coating film on the surface of a polished or coated metal.

ADVANTAGE - The protective film has a good coating property, high adhesive strength and improved tear strength.

CHOSEN-DRAWING: Dwg.0/1

TITLE-TERMS: POLYPROPYLENE PROTECT FILM METAL SURFACE THREE LAYER
STRUCTURE

LAYER CONSIST COMPOSITION COMPRISE PROPYLENE HOMOPOLYMER

ETHYLENE

PROPYLENE COPOLYMER

DERWENT-CLASS: A17 A92 M13 P73

CPI-CODES: A04-G03E; A04-G06; A07-A02D; A12-P01A; M13-H05;

ENHANCED-POLYMER-INDEXING:

Polymer Index [1.1]

018 ; R00964 G0044 G0033 G0022 D01 D02 D12 D10 D51 D53 D58 D83 ;
H0000 ; S9999 S1285*R ; P1150 ; P1343

Polymer Index [1.2]

018 ; ND01 ; Q9999 Q7114*R ; K9552 K9483 ; K9701 K9676 ; B9999
B3554*R

; B9999 B5301 B5298 B5276 ; B9999 B4182 B4091 B3838 B3747 ;
K9745*R

; K9574 K9483 ; K9712 K9676 ; B9999 B3678 B3554

Polymer Index [1.3]

018 ; B9999 B4795 B4773 B4740

Polymer Index [2.1]

018 ; R00326 G0044 G0033 G0022 D01 D02 D12 D10 D51 D53 D58 D82 ;
R00964 G0044 G0033 G0022 D01 D02 D12 D10 D51 D53 D58 D83 ; H0022
H0011 ; S9999 S1285*R ; P1150 ; P1285

Polymer Index [2.2]

018 ; ND01 ; Q9999 Q7114*R ; K9552 K9483 ; K9701 K9676 ; B9999
B3554*R

; B9999 B5301 B5298 B5276 ; B9999 B4182 B4091 B3838 B3747 ;
K9745*R

; K9574 K9483 ; K9712 K9676 ; B9999 B3678 B3554

Polymer Index [2.3]

018 ; B9999 B4784 B4773 B4740

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: C2000-176152

Non-CPI Secondary Accession Numbers: N2000-436314

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the polypropylene system multilayer film which has adhesive strength with the firm adhesives suitable for the protection (protection) film of the paint film of the surface of metal which carried out polish finishing in detail, or the painted surface of metal, and strong tear reinforcement about the polypropylene system multilayer film suitable for protection (protection) of a surface of metal.

[0002]

[Description of the Prior Art] Many methods of preventing that a front face gets an automobile damaged when carrying out overseas export, domestic conveyance and, and stick a polyolefine system film for the purpose of prevention, and the blemish at the time of transportation reaches the body of a metal and the paint film are adopted recently. Both sides of the ease of the exfoliation from the surface of metal which is needed at the process after the moderate adhesive property and the transportation when sticking this film on a surface of metal are completed are required for the film (a protection film will be called from now on.) used for protection of a surface of metal.

[0003] It carries out the mixture which contains 60 - 95% of polyethylene, and 40 - 45% of polypropylene as these surface-protections film, for example -- much more -- ** -- polyethylene -- others -- much more -- ** -- what applied the binder to the co-extrusion film to carry out (JP,59-27782,B) -- The inside of polypropylene, polyethylene, and ethylene-propylene copolymerization, What applied the binder to the film which made two sorts or three sorts the constituent of mixture, was mixed and carried out extrusion molding of the propylene part so that 15% or more and a polyethylene part might be included 25% or more (JP,50-14667,A), What prepared the glue line in one side of the film which fabricated the mixed resin containing polyethylene resin 70 - 30 weight sections, and polypropylene resin 30 - 70 weight sections (JP,50-52141,A), What prepared the binder layer in the base material film which uses polypropylene as a principal component and comes to blend polyethylene and ethylene propylene rubber with it (JP,5-106175,A), The multilayer film (JP,6-328640,A) which an outer layer and a inner layer become from a polypropylene resin, and the middle class becomes from straight chain-like low density polyethylene is proposed.

[0004] These surface-protection films at the time of conveyance of a paint entire car, and storage However, a stone, When it uses for prevention, such as damage by dust, gas, a chemical, etc., gloss dotage, and discoloration, When [of an entire car] sticking or removing after use, the trouble where a film was beaten by the lengthwise direction often occurred, and in addition to the conventional engine performance, the tear reinforcement of the relation top of film production, especially a lengthwise direction was requested from offer of a 20Ns [/] or more base material film of mm.

[0005] conditions which specify each class which satisfies both properties -- especially, constitute a protection film in the multilayer film of a polypropylene system constituent, and aim at an improvement of a mechanical characteristic by the core layer, if I will aim at an adhesive improvement and it will try by the skin, the bleeding of the low-molecular-weight object from a core layer to a skin will be seen, or

if I will reduce this bleeding and it will try, a mechanical characteristic will get worse -- were not able to be found out.

[0006]

[Problem(s) to be Solved by the Invention] Low-molecular-weight object bleeding has the property in which adhesive strength was small excellent in and tear reinforcement was further excellent, and the purpose of this invention has it in it being suitable for protection of a surface of metal, and offering easily the polypropylene system protection film which can exfoliate. this invention persons inquired wholeheartedly so that they may get the film which solved said trouble. Consequently, when the film mentioned to claim 1 was used, the coating nature of a binder has the good film obtained, and it completed this invention for being improved that the tear reinforcement of the lengthwise direction which is the fault of the above-mentioned conventional technique is weak based on a header and this knowledge.

[0007]

[Means for Solving the Problem] The film for protection of this invention consists of the following configurations.

(1) -- the polypropylene system constituent with which each class of the multilayer film which consists of a three-tiered structure of (B)/(A)/(B) consists of a propylene homopolymer (it is called PP) and an ethylene-propylene copolymer (it is called RC) -- it is -- the (A) layer -- crystallinity -- from the polypropylene system constituent (a) which consists of PP and amorphia RC -- becoming -- this constituent (a) -- $[\eta] \text{ RC} = 1.7 - 2.8 \text{ dl/g}$;

$[\eta] \text{ RC}/[\eta] \text{ PP} = 0.7 - 1.2$;

$([\eta] \text{ RC}/[\eta] \text{ PP}) \times (\text{WPP}/\text{WRC}) = 1.0 - 3.0$;

The ethylene content of amorphia RC = it is the polypropylene system protection film which is in 25 - 55 % of the weight; and the range of "WRC-A" = 22-40 % of the weight, and is characterized by the (B) layer consisting of a polypropylene system constituent (b) with which "WRC-B" is satisfied of the following correlation types (1).

[0008]

$0.5 < \text{"WRC-B"}/\text{"WRC-A"} < 1.0$ Correlation type (1)

(The limiting viscosity of the $[\eta] \text{ RC}$:amorphia RC, the limiting viscosity of $[\eta] \text{ PP}$:crystallinity PP, the weight of WPP:crystallinity PP, the weight of the WRC:amorphia RC, weight [of amorphia RC] % to a "WRC-A":this constituent (a), "WRC-B": Weight [of amorphia RC] % to this constituent (b))

(2) Polypropylene system protection film according to claim 1 characterized by being the polypropylene system constituent with which said constituent (b) which constitutes the (B) layer blended the crystalline (copolymer c) 1-50 % of the weight of crystalline PP and/or a propylene, and an alpha olefin as said (Constituent a) 50-99 % of the weight which constitutes the (A) layer.

[0009] of course, the polypropylene system constituent (a) which constitutes the (A) layer -- "-- the following -- only -- "a constituent (a)" -- saying -- the polypropylene system constituent (b) which constitutes the (B) layer -- "-- hereafter, even if the polypropylene system constituent (a) used for only calling it "a constituent (b)" is the same, they may differ.

[0010]

[Embodiment of the Invention] A constituent (a) is explained. A constituent (a) is a polypropylene system constituent which constitutes the (A) layer, and must satisfy a degree type.

$[\eta] \text{ RC} = 1.7 - 2.8 \text{ dl/g}$;

$[\eta] \text{ RC}/[\eta] \text{ PP} = 0.7 - 1.2$;

$([\eta] \text{ RC}/[\eta] \text{ PP}) \times (\text{WPP}/\text{WRC}) = 1.0 - 3.0$;

amorphia [ethylene content = 25 - 55% of the weight of] RC, and "WRC-A" = 22-40 % of the weight -- here -- $[\eta] \text{ RC}$: -- the limiting viscosity of amorphia RC, the limiting viscosity of $[\eta] \text{ PP}$:crystallinity PP, the weight of WPP:crystallinity PP, the weight of the WRC:amorphia RC, and weight % of amorphia RC to a "WRC-A":this constituent (a) are shown.

[0011] An isotactic pentad molar fraction is 0.955 or more preferably 0.95 or more, and crystalline PP has stereoregularity. Moreover, as for amorphia RC, an ethylene content contains 30 - 55% of the weight

of an ethylene polymerization unit preferably 25 to 55% of the weight. Moreover, $[\eta]$ RC requires that ultimate $[\eta]$ RC/ $[\eta]$ PP between $[\eta]$ PP(s) which are in 1.7 - 2.8 dl/g with the value measured in the 135-degree C tetralin, and were measured on condition that [same] crystalline PP should be in the range of 0.7-1.2.

[0012] Since $[\eta]$ RC cannot be measured directly when crystalline PP and amorphia RC are manufactured continuously and a constituent (a) is obtained, it asks by the following formula from the limiting viscosity ($[\eta]$ whole) of the crystalline whole $[\eta]$ PP and the crystalline whole constituent (a) of PP which can measure directly, and WRC. Weight % of amorphia RC to a WRC= constituent (a) is shown.

$[\eta]$ RC= $\{[\eta]$ whole-(1-WRC/100) $[\eta]$ PP} / (WRC/100)

[0013] the first stage story later mentioned as manufacturing continuously -- crystallinity -- it is what (the 2nd polymerization process) PP is manufactured (the 1st polymerization process) and amorphia RC is subsequently continuously manufactured for on a second stage story.

[0014] $[\eta]$ RC -- especially -- the working characteristic of a film -- influencing -- $[\eta]$ RC/ $[\eta]$ PP -- the crystallinity of amorphia RC -- the dispersibility to PP is influenced. The film production nature of the film which will be obtained if $[\eta]$ RC is too large gets worse, and it becomes a problem in respect of productivity. on the other hand -- crystallinity -- a limiting viscosity ratio with PP -- if too small, the bleeding of a low-molecular-weight object is large, and adhesive strength with adhesives declines, and if too large, it will tear, and reinforcement will fall, and $[\eta]$ RC/ $[\eta]$ PP cannot attain the target property.

[0015] Moreover, $x([\eta]$ RC/ $[\eta]$ PP) (WPP/WRC) needs to be in the range of 1.0-3.0. If the value becomes small, the bleeding of the low-molecular-weight object in low temperature will be large, and adhesive strength with adhesives will decline, and if it becomes large, it will tear, and reinforcement falls, and the target property cannot be attained. "WRC-A" shows weight % of amorphia RC to the constituent (a) in the (A) layer.

[0016] (A) If a layer consists of constituents (a) with which are satisfied of the above-mentioned range, it may consist of two or more sorts of constituents chosen as arbitration in the range of the above-mentioned presentation and/or physical properties. Moreover, the melt flow rate (MFRwhole) (230 degrees C, 21.18Ns of loads) of a constituent (a) has desirable 0.1 - 50g / 10 minutes from the point of the moldability at the time of film shaping, and the appearance of the film obtained, and its 0.5 - 20g / 10 minutes are still more desirable. This MFRwhole It is adjusted by selecting suitably the melt flow rate (MFRPP) of crystalline PP, and the melt flow rate (MFRRC) of amorphia RC.

[0017] By satisfying the above-mentioned presentation and many above-mentioned physical properties, the constituent (a) and the (A) layer which are used for this invention are suitably used as a film which was excellent in the below-mentioned constituent (b), as a result compatibility with the (B) layer, and was excellent in the tear reinforcement of a lengthwise direction. As long as a constituent (a) satisfies many above-mentioned properties, it may be manufactured by what kind of approach. PP and amorphia RC may be mixed and manufactured using mixed equipment. of course, the crystallinity used for this invention manufactured separately -- moreover, crystallinity -- PP -- manufacturing -- succeedingly -- this -- copolymerization of a propylene and the ethylene may be carried out to the bottom of existence of crystalline PP, amorphia RC may be manufactured, and a constituent (a) may be manufactured continuously.

[0018] Next, a constituent (b) is explained. A constituent (b) is a polypropylene system constituent which constitutes the (B) layer of the polypropylene system protection film of this invention, and requires that it should consist of a constituent "WRC-B" of a degree type has the relation of a correlation type (1) although especially the presentation component should not be restricted. "WRC-A" and "WRC-B" are determined by choosing suitably the amount of amorphous RC components of a constituent (a) and a constituent (b), and can adjust the physical properties of the (A) layer and the (B) layer by selecting those values suitably.

[0019]

$0.5 < \text{"WRC-B"/"WRC-A"} < 1.0$ Correlation type (1)

(Weight [of amorphia RC] % to the constituent (a) in a "WRC-A":(A) layer, weight [of amorphia RC]

% to the constituent (b) in a "WRC-B":(B) layer)

"WRC-B" The fall of the adhesive strength of a protection film is expected for / "WRC-A" to be 1.0 or more, and the fall of the tear reinforcement of this film is accepted to be 0.5 or less.

[0020] PP contained in a constituent (b) -- crystallinity -- it is desirable to make PP into a subject. Moreover, RC may include Crystallinity RC in the range with which are satisfied of the above-mentioned correlation type (1). Furthermore, a constituent (b) can also consist of constituents which blended two or more constituents with which the presentation ratios of PP component and RC component differ. It is desirable with a means with brief as a concrete preparation means of such a constituent (b) using a constituent (a), and the following example is given.

[0021] ** Choose the constituent (a) which has small "WRC-A" (this is made into "WRC-A2") compared with the constituent (a) which has specific "WRC-A" (this is made into "WRC-A1") as a constituent (b). Namely, "WRC-B" = "WRC-A2" < "WRC-A1." For example, the one to example 3 below-mentioned reference.

** Blend a polypropylene system constituent with few amorphous RC contents with a constituent (a). For example, the example 7 below-mentioned reference.

[0022] Moreover, as for this invention, it is desirable to consist of a constituent (a) 50 - 1 - 50 % of the weight of (c) components, [which is mixed by 99 % of the weight and this constituent (a)] The constituent (a) used for the constituent (a) which constitutes a layer, and the constituent (b) which constitutes the (B) layer (A) When the same, When a constituent (a) exceeds 50 % of the weight and 99 or less % of the weight and the (c) component consist of less than 50 % of the weight 1 % of the weight or more, a constituent (b) There is an advantage that desired "WRC-B" can be obtained certainly easily, as a result this invention film of desired physical properties can be obtained easily.

[0023] (c) a component -- crystallinity -- from the crystalline copolymer (only henceforth "a crystalline copolymer") of PP and/or a propylene, and an alpha olefin -- becoming -- crystallinity -- PP -- independent or a crystalline copolymer -- concomitant use (henceforth "a constituent (c)") of independent or these both is sufficient, and, in any case, it is used the one to 50 above-mentioned % of the weight. The propylene content of a crystalline copolymer is 90 - 99 % of the weight.

[0024] Although a constituent (c) becomes this crystalline copolymer from crystalline PP, it may be blended with a desired compounding ratio according to the physical properties of a request of a constituent (b), as a result the protection film of this invention. the crystallinity used for a constituent (b) -- when the limiting viscosity of PP influences mechanical properties, such as an adhesive property with the adhesives applied to (B) layer front face, and tear reinforcement of this invention film, and there is limiting viscosity under the category of [1.7] 2.8, an adhesive property and tear reinforcement become good.

[0025] As an alpha olefin used for manufacture of a crystalline copolymer, although ethylene, 1-butene, 1-pentene, 1-hexene, 1-octene, 1-decene, 1-dodecen, 1-tetra-decene, 1-hexa decene, 1-octadecene, 1-eicosen, 4-methyl-1-pentene, 3-methyl-1-pentene, etc. can be mentioned, ethylene and 1-butene are desirable.

[0026] The constituent (a) used for this invention can illustrate more suitably the manufacture approach shown below. In addition, a constituent (b), a component (c), etc. which are used by this invention can be manufactured according to this. the bottom of existence of the stereoregularity catalyst which the production process of a constituent (a) becomes from the titanium content solid-state catalyst component, organoaluminium compound, and organic silicon compound of the diameter of a large drop, and the inside of a gaseous phase -- setting -- a first stage story -- crystallinity -- PP is manufactured (the 1st polymerization process) and, subsequently it consists of manufacturing amorphia RC continuously on a second stage story (the 2nd polymerization process).

[0027] In this manufacture approach, it can also use a thing like a well-known throat, if the titanium content solid-state catalyst component made the electron-donative compound of ether and ester organic support, such as inorganic support, such as a magnesium compound, a silica compound, and an alumina, and polystyrene, react to the thing which supported the titanium compound, and this support if needed.

[0028] For example, the spray of the magnesium compound-alcoholic solution carries out, the partial

desiccation of this solid-state component carries out, the titanium content solid-state catalyst component (JP,3-119003,A official report) and the magnesium compound which processes this desiccation solid-state component with halogenation titanium and an electron-donative compound after an appropriate time, and changes dissolve in a tetrahydrofuran / alcohol / electron donor, and the titanium content solid-state catalyst component (a JP,4-103604,A official report) which processes the magnesium support deposited in the combination of $TiCl_4$ independent one or an electron donor with halogenation titanium and an electron-donative compound, and changes is mentioned.

[0029] As for a titanium content catalyst component, 25-300 micrometers of 30-150-micrometer things are usually preferably used for mean particle diameter. It becomes the big hindrance of stable operation that conveyance of the fine particles by which the fine-particles fluidity of a constituent (a) was remarkably spoiled in 25 micrometers or less, and the mean particle diameter of a titanium content catalyst component was discharged from the contamination in the polymerization system by the adhesion to a container wall, a stirring aerofoil, etc. of curing units or curing units becomes difficult etc. [0030] Moreover, the uniformity coefficient in normal distribution has [a titanium content catalyst component] 2.0 or less desirable thing. If a uniformity coefficient exceeds 2.0, the powder fluidity of a polypropylene system constituent will get worse, and stable operation by continuation will become difficult.

[0031] As an organoaluminium compound, a general formula can use suitably the organoaluminium compound expressed with R_1mAlX_3-m (for the inside R_1 of a formula X expresses a halogen atom for the congener or the different species which is a hydrocarbon group or alkoxy groups, such as an alkyl group of carbon numbers 1-20, a cycloalkyl radical, and an aryl group, and m is the positive number of $3 \geq m \geq 1.5$).

[0032] Specifically Trimethylaluminum, triethylaluminum, tree n-propyl aluminum, Tree n-butyl aluminum, tree i-butyl aluminum, dimethyl aluminum chloride, Diethyl aluminum chloride, sesquimethyl aluminiumsesquichloride, G n-propyl aluminum chloride, sesquiethylaluminiumsesquichloride, Ethyl aluminum dichloride, diethyl aluminum iodide, ethoxy diethyl aluminum, etc. can be mentioned, and triethylaluminum is used preferably. These organoaluminium compounds can be used as independent one sort or two or more sorts of mixture.

[0033] As an organic silicon compound, the organic silicon compound expressed with general formula $R_2X R_3YSi(OR_4) z$ (the hydrocarbon group in which the inside R_2 of a formula and R_4 contain a hydrocarbon group in, and R_3 contains a hydrocarbon group or a hetero atom is expressed, and it is $0 \leq X \leq 2$, $1 \leq Y \leq 3$, $1 \leq Z \leq 3$, and $X+Y+Z=4$) is used.

[0034] Specifically Methyl trimethoxysilane, ethyltrimethoxysilane, n-propyltrimethoxysilane, phenylmethyldimethoxysilane, t-butyltrimethoxysilane, t-butyltriethoxysilane, phenyltriethoxysilane, Methylethyl dimethoxysilane, methylphenyl diethoxysilane, Dimethyldimethoxysilane, dimethyl diethoxysilane, diisopropyl dimethoxysilane, Diisobutyl dimethoxysilane, G t-butyl dimethoxysilane, diphenyldimethoxysilane, trimethylmethoxysilane, cyclohexyl methyldimethoxysilane, trimethylethoxysilane, etc. can be mentioned.

[0035] Preferably, diisobutyl dimethoxysilane, diisopropyl dimethoxysilane, G t-butyl dimethoxysilane, cyclohexyl methyldimethoxysilane, and diphenyldimethoxysilane are used.

[0036] These organic silicon compounds can be used as independent one sort or two or more sorts of mixture.

[0037] Although the stereoregularity catalyst which combined the organic silicon compound said titanium content solid-state catalyst component, an organoaluminium compound, and if needed is used for the propylene polymerization of the 1st polymerization process, as for this titanium content solid-state catalyst, it is desirable to use the catalyst which the alpha olefin was made to react beforehand and carried out reserve activation.

[0038] In the reserve activation of a titanium content solid-state catalyst component Although especially the amount of the organoaluminium compound used is not limited As opposed to one mol of titanium atoms in a titanium content solid-state catalyst component Usually, 0.1-40 mols, It uses in 0.3-20 mols preferably, and 0.1-100g [per 1g of titanium content solid-state catalyst components] 0.5-50g is made

for the below-mentioned alpha olefin to usually react preferably over 10 minutes - 48 hours at 10-80 degrees C.

[0039] In reserve activation, 0.01-10 mols of organic silicon compounds may usually be beforehand used in 0.05-5 mols preferably to one mol of organoaluminium compounds. As an organoaluminium compound used for the above-mentioned reserve activation, said illustrated organoaluminium compound which is used for this polymerization can be mentioned. Although the thing of the class in which a thing of the same kind also differs from the organoaluminium compound used at the time of this polymerization as this organoaluminium compound can also be used, it is triethylaluminum preferably.

[0040] Moreover, as an organic silicon compound used for reserve activation if needed, said illustrated organic silicon compound and a thing of the same kind can be mentioned. The organic silicon compound used for this polymerization also as this organic silicon compound and a thing of the same kind can also use a different thing, and use diisobutyl dimethoxysilane, diisopropyl dimethoxysilane, G t-butyl dimethoxysilane, cyclohexyl methyl dimethoxysilane, and diphenyldimethoxysilane preferably.

[0041] As an alpha olefin used for the reserve activation of a titanium content solid-state catalyst component, ethylene, a propylene, 1-butene, 1-pentene, 1-hexene, 1-octene, 1-decene, 1-dodecen, 1-tetra-decene, 1-hexa decene, 1-octadecene, 1-eicosen, 4-methyl-1-pentene, 3-methyl-1-pentene, etc. can be mentioned.

[0042] Two or more sorts of mixture of not only independent but other alpha olefins may be used for these alpha olefins. Moreover, in order to adjust the molecular weight of a polymer on the occasion of the polymerization, molecular weight modifiers, such as hydrogen, can also be used together.

[0043] The inactive solvent used for the reserve activation of a titanium content solid-state catalyst component is an inactive solvent which does not affect remarkably polymerization reactions, such as a silicone oil with the structure of liquefied saturated hydrocarbon, such as a hexane, a heptane, an octane, Deccan, a dodecane, and a liquid paraffin, or dimethylpolysiloxane. Any of one sort of independent solvents or two or more sorts of partially aromatic solvents are sufficient as these inactive solvents. As for impurities which have a bad influence on a polymerization on the occasion of use of these inactive solvents, such as moisture and a sulfur compound, it is desirable to use it, after removing.

[0044] Continuation implementation of the 1st polymerization process which carries out the polymerization of the propylene into a gaseous phase to the bottom of existence of the titanium content solid-state catalyst component by which reserve activation was carried out [above-mentioned], and the 2nd polymerization process which subsequently performs copolymerization of a propylene and an alpha olefin is carried out. Although the 1st polymerization process is not limited to a vapor-phase-polymerization method but a slurry polymerization method and a bulk-polymerization method may be adopted, since it is desirable that the 2nd polymerization process which follows it is a vapor-phase-polymerization method, it is desirable that the 1st polymerization process also adopts a vapor-phase-polymerization method. As the 2nd polymerization process, when a slurry polymerization method and a bulk-polymerization method are adopted, the copolymer obtained may be eluted in a solution and continuation of stable operation may become difficult.

[0045] Although the polymerization conditions of the 1st polymerization process change also with polymerization formats Carrying out mixed churning in curing units by using the propylene polymer fine particles of a constant rate as a dispersant in the case of a vapor-phase-polymerization method Under existence of the stereoregularity catalyst which consists of the titanium content solid-state catalyst component, organoaluminium compound, and organic silicon compound by which reserve activation was carried out, polymerization temperature -- usually -- 20-120 degrees C -- desirable -- 40-100 degrees C and the polymerization preassure force -- usually -- atmospheric pressure -9.9MPa -- desirable -- the bottom of the condition of 0.59-5.0MPa -- a propylene -- supplying -- crystallinity -- the polymerization of the PP is carried out.

[0046] the rate of an use rate of an organoaluminium compound and a titanium content solid-state catalyst component -- aluminum/Ti=1-500 (mole ratio) -- it is 10-300 preferably. In this case, the number of mols of a titanium content solid-state catalyst component means the number of Ti gram atoms in a titanium content solid-state catalyst component substantially.

[0047] the rate of an use rate of an organic silicon compound (C) and an organoaluminium compound (B) -- $B/C=1-10$ (mole ratio) -- it is 1.5-8 preferably. case the mole ratio of this B/C is excessive -- crystallinity -- the crystallinity of PP falls and the rigidity of a constituent becomes inadequate. Moreover, when too little [a B/C mole ratio], polymerization activity falls remarkably, and productivity falls.

[0048] Use of a molecular weight modifier like hydrogen is possible at the time of a polymerization, and accommodation of the molecular weight of crystalline PP carries out so that [eta] PP may satisfy the requirements for this invention. Some fine-particles polymers which generated crystalline PP after the polymerization can be extracted, and measurement of limiting viscosity, a melt flow rate, and the polymerization yield per catalyst unit weight can be presented.

[0049] the polymerization of the propylene of the 1st polymerization process -- continuing -- polymerization temperature -- usually -- 20-120 degrees C -- desirable -- 40-100 degrees C and the polymerization pressure force -- usually -- atmospheric-pressure - the 2nd polymerization process which the mixed monomer of a propylene and ethylene is preferably copolymerized [process] under the conditions of 0.59-5.0MPa, and makes amorphia RC generate 9.9 MPa is carried out. The ethylene content in amorphia RC is adjusted so that the gas mole ratio of the ethylene monomer in comonomer gas and a propylene monomer may be controlled and the ethylene content in the amorphia RC obtained may become 25 - 55% of the weight.

[0050] on the other hand -- crystallinity -- the polymerization activity modifier of the catalyst of accommodation and the carbon monoxide of polymerization time amount, a hydrogen sulfide, etc. is used for the weight (WRC) of amorphia RC to the weight (WPP) of PP, and it adjusts it so that it may become 25 - 55% of the weight to the constituent (a) with which the weight (WRC) of this amorphia RC is obtained. Furthermore, as for the molecular weight of amorphia RC, it is desirable to add a molecular weight modifier like hydrogen at the time of copolymerization, and to be adjusted so that [eta] RC may satisfy the requirements for a constituent (a). Moreover, the supply approach of hydrogen is supplied so that a constituent (a) may satisfy the requirements for this invention.

[0051] Although a batch process, half-continuous system, or continuous system can be used for the above-mentioned polymerization method, its continuous system is industrially desirable.

[0052] After termination of the 2nd polymerization process, a monomer can be removed from a polymerization system and a granular constituent (a) can be obtained. Measurement of limiting viscosity, measurement of an ethylene content, and measurement of the polymerization yield per catalyst unit weight are presented with some obtained constituents (a).

[0053] Next, the polypropylene system constituent of this invention is described. In the range which does not spoil the purpose of this invention, the anti-oxidant used for polyolefine, a neutralizer, a weathering agent, an inorganic bulking agent, an antiblocking agent, lubricant, etc. can usually be blended with the polypropylene system constituent used for this invention.

[0054] As this antioxidant, a phenolic antioxidant, the Lynn system antioxidant, etc. can be illustrated, higher-fatty-acid salts, such as calcium stearate, can be illustrated as this neutralizer, a calcium carbonate, a silica, a hydrotalcite, a zeolite, an aluminum silicate, a magnesium silicate, etc. can be illustrated as this inorganic bulking agent and an antiblocking agent, and higher-fatty-acid AMAIDO, such as stearic acid AMAIDO, can be illustrated as this lubricant.

[0055] The approach of blending the above-mentioned additive etc. with a polypropylene system constituent can illustrate the approach of blending with a mixer with a high-speed agitator and ribbon blender lists, such as a Henschel mixer (trade name), with the usual combination equipments, such as a tumbler mixer, and can illustrate the approach of pelletizing using the further usual single screw extruder or twin screw extruder etc.

[0056] The protection film of this invention is an unstretched film using a polypropylene system constituent. As the manufacture approach of this film, the T-die method and tubular film process which are used for manufacture of a polyolefine film can usually be illustrated.

[0057] The protection film of this invention is a non-extended multilayer film which used the film using this polypropylene system constituent for at least three layers of the outermost layer, and it consists of a

three-tiered structure of (B)/(A)/(B) typically as lamination of this multilayer film. Here, (A) constitutes a core layer and (B) constitutes a skin. The protection film of this invention is not restricted to the structure which consists only of the three above-mentioned layers, for example, can also be constituted in (B)/(A)/(B)/(A)/(B), (B)/(A)/(B)/(A)/(B)/(A)/(B), etc.

[0058] Although especially the total thickness of this multilayer film is not limited, 20-100 micrometers is 30-70 micrometers desirable still more preferably in respect of the moldability of a film. Moreover, although especially the thickness of each class of this multilayer film is not limited, it is the point of tear reinforcement, and it is desirable that the ratio of the thickness of the (A) layer using the constituent (a) to the total thickness of a film is 10 - 90%, and 20 - 80% is still more desirable.

[0059] The T-die method or tubular film process which carries out multilayer extrusion, can illustrate the fabricating method etc., carries out this multilayer extrusion as the manufacture approach of this multilayer film, and is usually used for manufacture of a polyolefine film as a fabricating method can be illustrated.

[0060] the above -- although especially the polypropylene system constituent that constitutes each class is not limited when manufacturing this multilayer film by the well-known approach, it is desirable that the melt flow rate:film MFR of the multilayer film itself (at:230 degree C, 21.18Ns of loads) is in the range of 0.5-10.0g / 10min.

[0061] Of course, the protection film obtained by this invention is the purpose which promotes grant of printing nature, lamination fitness, and a metal vacuum evaporatio no property, and it cannot be overemphasized that surface treatment, such as corona discharge treatment, and flame treatment, plasma treatment, is possible by the approach usually adopted industrially.

[0062]

[Example] Although an example and the example of a comparison are used for below and this invention is concretely explained to it, this invention is not limited to these at all. In addition, the physical-properties measuring methods, such as a constituent used in the example and the example of a comparison, are as follows.

(a) Limiting viscosity (unit; dl/g) : it measured under the 135-degree C temperature condition using the automatic viscosity measuring device (AVS2 mold, Mitsui Toatsu Chemicals, Inc. make), using a tetralin (tetrachloronaphthalene) as a solvent.

[0063] (b) The grain size (unit;mum) and the uniformity coefficient of a titanium content solid-state catalyst component : the value which made grain size mean particle diameter computed from the particle size distribution measured using the master sizer (MALVERN shrine make), and broke the particle size of a minus sieve by particle size of a minus sieve 10% 60% was made into the uniformity coefficient.

[0064] (c) Ethylene content (unit; weight %) : it measured with the infrared absorption spectral method.

(d) Polymer yield per catalyst unit weight : a part for Mg in a sample was measured by the RF inductively-coupled-plasma-atomic-emission-spectroscopy method (the ICP method), and was computed from a part for obtained Mg.

[0065] The manufacture approach of the polypropylene system constituent used for below in an example and the example of a comparison is shown. The examples 1-9 (manufacture of constituent BC-1-9) of manufacture

1) The preparation a titanium content solid-state catalyst component of a titanium content solid-state catalyst component : it is anhydrous [MgCl_2 / 2] to the autoclave made from SUS which carried out the nitrogen purge. 95.3g and desiccation EtOH(ethanol)352ml were put in, and 105 degrees C was made to heat and dissolve this mixture in the bottom of stirring. It fed into the two-phase flow spray nozzle after 1-hour stirring with the pressurization nitrogen (1.1MPa) which heated this solution at 105 degrees C. The flow rate of nitrogen gas was 38l/min. the inside of a spray tower -- as the object for cooling -- liquid nitrogen -- introducing -- a column -- whenever [internal temperature] was held at -15 degrees C. a product -- a column -- it was collected into the cooling hexane introduced into the inside pars basilaris ossis occipitalis, and 256g was obtained. The presentations of the analysis result of a product to this support were the same MgCl_2 and 6EtOH as a start solution.

[0066] In order to use for support, it sifted out and 205g of globular form support was obtained with the

particle size of 45-212 micrometers. At the room temperature, through flow drying of the obtained support was carried out for 181 hours using the nitrogen of the flow rate of 3 l/min., and the presentation obtained the desiccation support of MgCl_2 and 1.7EtOH.

[0067] diisobutyl phthalate after mixing 20g [of desiccation support], 160ml [of titanium tetrachlorides], and purification 1,2-dichloroethane 240ml in glass flask and heating at 100 degrees C under stirring 6.8ml -- in addition, after heating at 100 more degrees C for 2 hours, except for the liquid phase section, 160ml [of titanium tetrachlorides] and purification 1,2-dichloroethane 320ml was again added by the decantation. After carrying out heating maintenance at 100 degrees C for 1 hour and the decantation washed by the purification hexane except for the liquid phase section, it dried and titanium content solid-state catalyst component: I-1 was obtained. The mean particle diameter of the obtained titanium content solid-state catalyst component (I) was 115 micrometers, and the analysis value was 19.5 % of the weight of Mg, 1.6 % of the weight of Ti, 59.0 % of the weight of Cl(s), and 4.5 % of the weight of diisobutyl phthalate.

[0068] 2) After nitrogen gas permutes the reactor made from SUS with an inclination wing of 15l. of reserve activation content volume of a titanium content solid-state catalyst component, 8.3l.

(CRYSTOL-52, Esso Sekiyu make) of saturated hydrocarbon solvents whose kinematic viscosity in 40 degrees C is 7.3 centistokes, After adding 700g of titanium content solid-state catalyst components prepared for triethylaluminum 525mmol, diisopropyl dimethoxysilane 80mmol, and the preceding clause at a room temperature, warmed to 40 degrees C, it was made to react by propylene partial pressure 0.15MPa for 7 hours, and reserve activation was performed. Propylene 3.0g had reacted per 1g of titanium content solid-state catalyst components as a result of analysis.

[0069] The titanium content solid-state catalyst component which carried out [above-mentioned] reserve activation to the horizontal-type curing units (die length / diameter = ratio-of-length-to-diameter=6, 100l. of content volume) which have an impeller in the flow sheet shown in drawing 1 of the 1st polymerization process attachment 3) 0.5 g/hr, Diisopropyl dimethoxysilane was continuously supplied as triethylaluminum and an organic silicon compound as an organoaluminium compound. In order to carry out continuation supply of the propylene so that the conditions of the reaction temperature of 70 degrees C, reaction pressure 2.5MPa, and agitating speed 40rpm may be maintained, and also to adjust the molecular weight of crystalline PP, hydrogen gas was supplied more nearly continuously than the circulation piping 2, and the limiting viscosity of a generation polymer was controlled by hydrogen concentration in the gaseous phase of a reactor.

[0070] The heat of vaporization of the raw material propylene to which heat of reaction is supplied from the raw material propylene piping 3 removed. The unconverted gas discharged from curing units let the unconverted-gas piping 4 pass, cooled, and it was made to condense it out of a reactor system, and flowed back to these curing units 1.

[0071] the crystallinity acquired with these curing units -- PP was continuously extracted from curing units 1 through piping 5 so that the possession level of a polymer might become 50 volume % of the reaction volume, and it was supplied to the curing units 10 of the 2nd polymerization process. At this time, a part of crystalline PP was intermittently extracted from the polymer draw piping 5, and it considered as the sample which calculates limiting viscosity and the polymer yield per catalyst unit weight.

[0072] 4) the horizontal-type curing units 10 (ratio-of-length-to-diameter=6, 100l. of content volume) which have the 2nd polymerization process impeller -- the crystallinity from the 1st polymerization process -- the mixed gas of PP and ethylene, and a propylene was supplied continuously, and copolymerization of ethylene and a propylene was performed. The reaction condition adjusted the ethylene unit content in amorphia RC by agitating speed 40rpm, the temperature of 60 degrees C, pressure 2.1MPa, and the ethylene / propylene mole ratio of a gaseous phase. In order to adjust the lap of amorphia RC, and to adjust a carbon monoxide and the molecular weight of amorphia RC as a polymerization activity inhibitor, hydrogen gas was supplied from the activity inhibitor installation piping 7, respectively.

[0073] The heat of vaporization of the raw material liquefied propylene supplied from the raw material

mixed-gas piping 6 removed heat of reaction.

[0074] The unconverted gas discharged from curing units let the unconverted-gas piping 8 pass, cooled, and it was made to condense it out of a reactor system, and made this copolymerization process flow back. The propylene system constituent generated at the copolymerization process was extracted from curing units 10 for the polymer draw piping 9 so that the possession level of a polymer might become 50 volume % of the reaction volume. The production rate of the polypropylene system constituent obtained was 8-12kg/hr.

[0075] The extracted polypropylene system constituent removed the monomer, and the part presented measurement by the ICP method with a part for Mg in a polymer in order to ask measurement of the ethylene content in the amorphia RC by limiting viscosity and the infrared absorption spectral method for the polymerization ratio of amorphia RC again. The physical properties of polypropylene system constituent BC-1-9 obtained in the examples 1-9 of manufacture were shown in Table 1.

[0076] The example 10 (manufacture of PP-1) of manufacture

the crystallinity of the example 1 of manufacture -- the manufacturing method of PP -- applying correspondingly -- crystallinity -- PP was manufactured.

The example 11 (manufacture of PP-2) of manufacture

Crystallinity RC was manufactured according to the manufacturing method of amorphia RC of the example 1 of manufacture.

The example 12 (manufacture of PP-3) of manufacture

The polypropylene system constituent was manufactured according to the example 1 of manufacture.

[0077] The physical properties of obtained PP-1-3 were shown in Table 2. MFRPP and MFRWHOLE Or MFR was measured according to the following film MFR. In addition, about MFRRC, it computed by the following type.

$\log(\text{MFRWHOLE}) = \text{WPP}/100 \times \log(\text{MFRPP}) + \text{WRC}/100 \times \log(\text{MFRRC})$

[0078] The evaluation approach of the film used in the example and the example of a comparison depended on the following approach.

(1) According to film MFR(unit; g/10min):JIS K 7210, it let the regular die pass by 21.18 Ns of temperature loads of 230 degrees C, and the weight which flows a film into melting extrusion unit time amount was found.

[0079] (2) Tear reinforcement (unit; N/mm) : according to ASTM D 1922, the 20mm notch was put into the test piece of a film, and it asked for the energy required for tearing remaining 43mm.

[0080] (3) Peel strength trial (unit; N/15mm) : pull a part of 15x100mm test piece to the opposite direction of each stripping (hauling rate 300mm/min.), make it exfoliate, and measure the strength at that time. It is so good that reinforcement is strong.

[0081] As opposed to BC-1 shown in Table 1, or 99.75% of the weight of BC-4 (Example 1)

Respectively 0.05 % of the weight of tetrakis [methylene (3, 5-G t-butyl-4-hydroxyphenyl) propionate] methane, In 0.1 % of the weight of tris (2, 4-G t-buthylphenyl) FOSU fights, and the blending ratio of coal of 0.1 % of the weight of calcium stearates, with a Henschel mixer (trade name) After mixing, the object for (B) layers which forms the pellet for (A) layers (AA) (it corresponds to constituent BC-1) or skin which forms a core layer as melting kneading is carried out, it pelletizes at 200 degrees C using a single screw extruder (aperture 40mmphi) and it is shown in Table 3 -- correspondence) was manufactured to (Pellet BB) (constituent BC-4).

[0082] The three-sort three-layer extruder equipped with the multilayer T die (a single screw extruder with an aperture [phi] of 65mm one set) The single screw extruder of this 50mmphi supplies the above-mentioned pellet (AA) and a pellet (BB) to a respectively different extruder using two sets. The three-layer non-oriented film which is made to carry out melting at 230 degrees C, carries out cooling solidification with a co-extrusion, an air chamber, and a cooling roller with a skin temperature of 30 degrees C, and consists of the thickness of 70 micrometers, (B)/(A)/(B), and (thickness percentage =1/2/1) was obtained.

[0083] (Examples 2-4) The three-layer non-oriented film was obtained like the example 1 except having used the pellet which replaced with both BC-1 of an example 1, and BC-both [one side or], and was

changed into the constituent given in Table 3.

In an example 1, BC-5 are used as a pellet of the (A) layer. (Examples 5-8) (B) -- a layer -- as a pellet -- the mixture (the "% of Table" 3 -- weight % --) of BC-4 and PP-1, PP-2, or PP-3 Moreover, "WRC-B" of a constituent (b) used the pellet set to WRC of each component from it being the sum of the value which squared these weight ratio, and also obtained the three-layer non-oriented film like the example 1.

(Examples 1-6 of a comparison) The three-layer non-oriented film was obtained like the example 1 except having used the pellet which replaced with both BC-1 of an example 1, and BC-both [one side or], and was changed into the constituent given in Table 4. In addition, the mixture (the "% of Table" 3 is weight %) of BC-4 and PP-1 was used for the (B) layer of the example 3 of a comparison.

[0084] It aged for two days at lamination and 40 degrees C using the binder which shows the obtained three-layer non-oriented film and the piece of a metal (15mmx100mm) by which the front face was painted below, and completely, after hardening by drying, the binder pulled the peel strength of 90 degrees in an interface, evaluated by the testing machine, and showed the result in Table 3 (examples 1-8) and 4 (examples 1-6 of a comparison). The binder which carried out 0.1 weight section mixing of 35 weight sections and the epoxy cross-linking agent (trade name: TETORADDO X, Mitsubishi Gas Chemical Co., Inc. make) for ethyl acetate at the acrylic copolymer (it is with acrylic-acid n-butyl 98 weight section, acrylic-acid 2 weight section, and polymerization initiator, the lauroyl peroxide 0.5 weight section is dissolved in ethyl acetate, and it is N2 what carried out volatilization removal of ethyl acetate after making it react for 8 hours and carrying out polymerization under reflux temperature of ethyl acetate under ambient atmosphere) 100 weight section.

[0085] From the result of Tables 1-4, for examples 1-8, it consists of constituents (a) and the (A) layer is

[eta] RC=1.7 - 2.8 dl/g.;

[eta] RC/[eta] PP=0.7-1.2;

([eta] RC/[eta] PP) x(WPP/WRC)=1.0-3.0;

The ethylene content of amorphia RC = it is in 25 - 55 % of the weight; and the range of "WRC-A" =22-40 % of the weight, and since the (B) layer consists of a constituent (b) with "WRC-B" which satisfies correlation type (1): $0.5 < \text{"WRC-B"/"WRC-A"} < 1.0$, it turns out that an adhesive property and tear reinforcement are good.

[0086] On the other hand, even if the (A) layer consists of constituents (a) of this invention, when "WRC-B"/"WRC-A" is 1.0 or more (examples 1 and 2 of a comparison), the fall of adhesive strength is seen, and when it is 0.5 or less (example 3 of a comparison), the fall of tear reinforcement is accepted.

[0087] Moreover, the following results were obtained in the examples 4-6 of a comparison in which the (A) layer does not consist of constituents (a) of this invention. In addition, the example 5 of a comparison has only satisfied the correlation type (1) formally. (A) In a layer, [eta] RC and ([eta] RC/[eta] PP) x(WPP/WRC) of amorphia RC in the example 4 of a comparison using a larger constituent than the range of this invention It tears with the fall of adhesive strength, and a strong fall is accepted, and the fall of adhesive strength is accepted in the (A) layer in the example 5 of a comparison using a constituent with [eta] RC of amorphia RC and [eta] RC/[eta] PP smaller than the range of this invention. Moreover, in the (A) layer, WRC of amorphia RC tears small ([eta] RC/[eta] PP) in the example 6 of a comparison using a constituent with larger x(WPP/WRC) than the range of this invention, and a strong fall is accepted.

[0088] As mentioned above, although the effectiveness of tearing the multilayer film specified by this invention with the coating nature of adhesives, and excelling in reinforcement is demonstrated, it turns out that the multilayer film shown in the example of a comparison is inferior in respect of any.

[0089]

[Table 1]

表1

製造例	製造例1	製造例2	製造例3	製造例4	製造例5	製造例6	製造例7	製造例8	製造例9
組成物	BC-1	BC-2	BC-3	BC-4	BC-5	BC-6	BC-7	BC-8	BC-9
《結晶性PP》									
WPP [重量%]	70.8	70.3	71.1	75.0	62.2	72.3	70.8	69.5	82.4
$[\eta]_{PP}$ [dl/g]	2.05	1.85	2.05	1.90	1.85	1.80	1.40	2.30	1.80
MFR _{PP} [g/10min]	2.8	4.5	2.8	3.2	4.5	3.0	34.0	1.5	6.2
《非晶性RC》									
WRC [重量%]	29.2	29.7	28.9	25.0	37.8	27.7	29.2	30.5	17.7
RC含有量 [重量%]	34	35	35	36	33	36	36	36	34
$[\eta]_{RC}$ [dl/g]	2.0	1.85	1.90	1.85	1.85	1.80	2.95	1.40	1.80
MFR _{RC} [g/10min]	3.5	4.0	2.8	4.0	4.2	4.5	0.32	27.3	5.9
《全体》									
W_{PP}/W_{RC} [-]	2.42	2.37	2.46	3.00	1.65	2.61	2.42	2.28	4.66
$[\eta]_{RC}/[\eta]_{PP}$ [-]	0.98	1.00	0.93	0.97	1.00	1.00	2.10	0.61	1.00
$([\eta]_{RC}/[\eta]_{PP}) \times (W_{PP}/W_{RC})$ [-]	2.37	2.37	2.29	2.91	1.65	2.61	5.01	1.39	4.66
MFR _{WHOLE} [g/10min]	3.2	4.2	2.8	3.5	4.3	3.8	4.8	3.0	6.2

注) WPP: $100 \times \text{結晶性PP} / (\text{結晶性PP} + \text{非晶性RC})$ 、WRC: $100 \times \text{非晶性RC} / (\text{結晶性PP} + \text{非晶性RC})$

[0090]

[Table 2]

表 2

製造例	製造例10	製造例11	製造例12
	PP-1	PP-2	PP-3
《結晶性PP》			
WPP [重量%]	100	—	85
$[\eta]_{PP}$ [dl/g]	2.17	—	1.02
MFR _{PP} [g/10min]	2.3	—	5.4
《非晶性RC》			
WRC [重量%]	0	0	15
エチレン含有率 [重量%]	—	—	50
$[\eta]_{RC}$ [dl/g]	—	—	5.37
MFR _{RC} [g/10min]	—	—	0.03
《結晶性RC》			
含有量 [重量%]	0	100	0
エチレン含有率 [重量%]	—	2.5	—
極限粘度 $[\eta]$ [dl/g]	—	1.69	—
MFR [g/10min]	—	7.5	—
《全体》			
W_{PP}/W_{RC} [—]	—	—	5.66
$[\eta]_{RC}/[\eta]_{PP}$ [—]	—	—	5.26
$([\eta]_{RC}/[\eta]_{PP}) \times (W_{PP}/W_{RC})$ [—]	—	—	29.77
MFR _{WHOLE} [g/10min]	2.3	7.5	2.6

[0091]

[Table 3]

表3 多層フィルム物性

	実施例1	実施例2	実施例3	実施例4	実施例5	実施例6	実施例7	実施例8
(A) 層: コア層 : ペレット (AA)	BC-1	BC-2	BC-1	BC-5	BC-5	BC-5	BC-5	BC-5
(B) 層: スキン層 : ペレット (BB)	BC-4	BC-6	BC-3	BC-4	BC-4 90% PP-1 10%	BC-4 90% PP-2 10%	BC-4 90% PP-3 10%	BC-4 98% PP-1 2%
「WRC-B」 / 「WRC-A」	0.86	0.93	0.99	0.66	0.59	0.59	0.63	0.65
《多層フィルム物性》								
フィルムMFR (g/10min)	5.0	3.7	4.5	5.8	5.7	6.1	5.8	5.8
フィルム厚み (μm)	60	60	60	60	60	60	60	60
引き裂き強度 (N/mm)	50	56	55	35	25	26	34	35
接着力 (N/15mm)	3.0	2.7	2.5	3.2	3.5	3.5	3.3	3.2

[0092]

[Table 4]

表4 多層フィルム物性

	比較例1	比較例2	比較例3	比較例4	比較例5	比較例6
(A) 層: コア層 : ペレット (AA)	BC-1	BC-1	BC-5	BC-7	BC-8	BC-9
(B) 層: スキン層 : ペレット (BB)	BC-1	BC-5	BC-4 70% PP-1 30%	BC-1	BC-1	BC-1
「WRC-B」 / 「WRC-A」	1.00	1.29	0.46	1.00	0.96	1.65
《多層フィルム物性》						
7444MFR (g/10min)	5.0	5.6	5.6	6.0	4.6	7.0
7444厚み (μm)	60	60	60	60	60	60
引き裂き強度 (N/mm)	5.0	5.2	1.0	1.0	4.0	8
接着力 (N/15mm)	2.0	1.5	3.5	2.2	1.5	3.4

[0093]

[Effect of the Invention] The multilayer film of this invention has the good coating nature of adhesives, adhesive strength is strong, and it has the property in which tear reinforcement was further excellent. Therefore, this invention can be used suitable for the protection film used for protection of a surface of metal.

[Translation done.]